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Document Management and Imaging

TOOLKIT

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Contents

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Foreword

This toolkit has been developed to advance knowledge and practice of document management and imaging and its role in supporting the electronic health record (EHR).

It begins with the current document management and imaging landscape in supporting the adoption of the EHR, continues with document imaging operations and best practices, and concludes with system design options, considerations, implementation, and leadership. The toolkit includes one case study and eight appendices where more details, including tables, are provided to enhance the main content.

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Introduction

Transition to the Electronic Health Record using Document Management and Imaging Systems

Document management systems (DMSs) continue to play a very important part in capturing all the documentation needed to tell the patient's story. They allow for capture and simultaneous access to needed documentation and chart completion and provide a central repository of information. While the use of paper will continue to decrease over time, document management systems ultimately will support the electronic health record (EHR) transition. These systems will manage paper that continues to flow from the EHR, legacy systems, or from external entities to ensure processes are fluid for users, and act as a legal archive.

Assessing, selecting, implementing, and maintaining a DMS is an investment. Optimizing your investment and leveraging technology allows for cost savings and increased efficiencies. During the EHR transition, it is important for the health information management (HIM) professional to become and stay involved in order to ensure the department's processes and integration points to the EHR are incorporated into the project.

Meaningful use standards (and the accompanying opportunity to receive federal subsidies) are driving the adoption of EHRs. With the increased use of EHRs, it is more important than ever for the information stored outside the EHR to be available electronically. DMSs are a vital partner in capturing paper so that information can be incorporated into or accessible from the EHR.

Current Landscape and Supporting the EHR

Today's Document Management Systems

The terms Document Management System (DMS) and Enterprise-wide Document Management System are frequently used interchangeably. For the purpose of this toolkit, we will focus on DMSs used in the HIM department to enable and support the transition to the EHR. DMS simply refers to the management of documents, and in this toolkit, we will be referring to documents electronically captured for inclusion in the health record.

The DMS is often referred to as the software used primarily by HIM departments to handle the clinical and administrative documents pertaining to a patient's treatment. These are documents that are either unable to be built for use directly in the EHR or have not yet been built. These documents are typically scanned or acquired electronically post-discharge, but may also be scanned or captured concurrent to the episode of care at point of service. Other processes pertaining to the DMS include chart completion, workflow, and release of information (ROI).

DMSs are also used throughout an organization to help reduce the amount of paper that must be handled and tracked. Organizations frequently use the same vendor for all their document management needs, not only in HIM, but also in areas such as human resources, patient financial services, purchasing, registration, and the medical staff office, to name a few, but it is the branching out to other business areas of the organization that turns the DMS into an enterprise-wide application.

Even as organizations make significant investments in a wide range of separate patient-centric systems, there is a continued need for DMS. DMS enables capture and access for many areas across the enterprise. Multiple locations exist in the enterprise where information regarding or influencing patient care can be stored in the EHR. Although information can be captured and accessed directly throughout these systems, the EHR is typically the environment that holds this consolidated information.

The most important reason for acquiring and implementing a DMS is to capture and manage the organization's documents, not to eliminate paper. Documents are organizational assets. Organizations must respect the necessity and strategic importance of managing its document assets just like the organization's data, information, and cash assets.

Organizations must properly manage documents; their failure to do so not only increases liability, but also risks information loss that can significantly affect patient safety and quality of care. Accordingly, many organizations are forming governance committees to identify and establish ownership of information repositories such as document management systems. When HIM professionals assume ownership of the information, they also assume stewardship or accountability for the decisions made with regard to information management. When new systems are implemented, integrations and migrations occur to consolidate data or for decision making when archiving, retrieving, retaining, or destroying information.

It is critical to incorporate process improvement principles when working with people, processes, and technology. Until the time that all internal and external (that is, outside the organization) documents are captured, indexed, and distributed electronically to the EHR, technologies such as classification recognition (such as bar coding, optical character recognition), point of service scanning, and work flow enhancements will continue to enhance productivity and help to achieve quality standards in the DMS.

HIM professionals must be included in the DMS enterprise-wide strategic plan to ensure that HIM standards of practice (including regulatory requirements) are met as the organization is crafting its strategy for years to come. The following questions that pertain specifically to the HIM department should be considered as the overall institutional DMS strategy is developed:

» What are the long-term goals for the following HIM processes?

» Defining and maintaining the designated record set (DRS) and legal health record (LHR)
  - Accuracy, integrity, and accessibility of information
  - Chart retrieval and viewing
  - Document capture
  - Chart completion, including electronic signature and deficiency management
  - ROI, including printing and exporting guidelines
  - Coding, abstracting, and migrating to ICD-10-CM/PCS
  - Transcription
  - MPI maintenance
  - Storage, retention, and destruction
  - Downtime or contingency planning
  - HIPAA, Joint Commission, CMS, and other regulatory compliance
  - Document management and information obligations imposed by health information exchange and accountable care organizations

» How do these HIM processes relate to clinical systems? For example, how will verbal order signatures be tracked, who will track them, and what impact will this have on computerized provider order entry (CPOE) systems?

» How are documents created, generated, and transitioned for CPOE implementation?

» What are the organizational goals surrounding decentralized versus centralized scanning?

» How will seamless integration with clinical systems be achieved?

» What HIM requirements are included in the organization's clinical health information systems and how will these be incorporated into request for proposals (RFPs) and procurement processes?

» What plans are instituted to promote physician and other clinician acceptance of organization-wide electronic document management? For example, will DMS functionality require online medical record access and chart completion?

Using Document Management as the Legal Archive

The legal health record (LHR) is comprised of those documents and data elements that a healthcare provider considers its official record of patient care. The "source of truth" or the official source system that you will use to respond to requests for copies of the LHR must be identified and included in an organization's LHR definition. During the EHR transition, the definition will need to be modified as documents move from being captured in the DMS to being created or captured in the EHR. There may be dual responsibilities for storing the LHR where portions of the record are stored in multiple places after a certain date if you are unable to integrate historical data from your DMS into your EHR.

With the existence of preliminary and final versions of a document, as well as original and corrected information, a healthcare organization must address the management of document versions. Once documentation has been made available for patient care, it must be retained, managed, and incorporated into the LHR whether or not the document was authenticated. A decision must be made on whether all versions of a document will be displayed or just the final, who has access to the various versions of a document, and how the availability of versions will be flagged in the health record.

Communication with stakeholders is critical when workflow changes are implemented and a document in the DMS is now being created and managed in the EHR. As more tools (such as interfaces, integrations, and workflow) are introduced into the organization, the processes in place and the flow of information must be reconsidered to ensure that the process remains efficient and information remains accurate. The tools available to manage and access the medical record are changing and, therefore, so must the approach to working with the new tools. Integration tools between DMS and the EHR should decrease the amount of manual work required to manage the health record, resulting in increased efficiency and accuracy in processes.

For more information on integration, see "Integration" under "System Design Options."

Record Retention and Destruction

A provider's records retention policy establishes how long an organization should keep documents, the medium in which the information will be kept, and where the records will be located. Existing retention schedules will likely need to be updated to reflect new document groupings when a new DMS is installed.

The record retention schedule is a critical component to planning a DMS implementation and works in conjunction with the destruction policy (see below). The length of the retention

period will determine in part the access, maintenance, and migration activities that must be factored as part of the imaging system's ongoing maintenance and storage costs. Those costs will continue to accrue for as long as the documents are retained.

All healthcare records, including those stored in a DMS, should be maintained and disposed of as part of a legally accepted information and records management policy in order to ensure their acceptance as legal documents. Policies should include descriptions of how long information must be maintained and retained. They should be based on federal requirements and the statute of limitations for each state, community practice, and accreditation agency. The principles of retention and destruction are critical to electronic discovery (e-discovery) procedures and the use of electronic evidence. Legal counsel should always be sought when constructing or revising these policies.

While there are no set standards regarding how long the converted records should be maintained, destruction of the paper should be carried out in accordance with federal and state law and pursuant to an approved organizational retention schedule and destruction policy. The destruction policy must be clearly communicated throughout the organization. AHIMA's updated "Retention and Destruction of Health Information" practice brief will provide additional guidance on record retention standards and destruction of health information for all healthcare settings.

Once a paper record has been converted to electronic media, it is standard practice that the paper is boxed up after it has been scanned, indexed, and released into the DMS or uploaded to the EHR. The HIM department should provide adequate, secure space for the retention of these records while they are being processed and moved throughout the quality assurance and corrections process.

Organizations should have processes in place to track completed records and the ability to run reports listing charts that have been released to the DMS or EHR within a certain timeframe to aid in identifying those charts that are eligible for destruction (for example, a report that shows all records that have been released more than 90 days from today's date).

Organizations should have a plan in place to destroy the paper-based records that have been incorporated into the EHR as soon as possible. The case can be made for destroying the paper when users have confidence and trust that the information has passed the quality assurance process, was properly converted and readily available in the DMS.

Disaster and Contingency Planning

Preparing for disaster is a must whether it is a natural disaster such as a flood or earthquake, a man-made disaster such as theft or terrorism, or an unintended man-made disaster such as an "error and omission" or fire due to a faulty system. Developing a business continuity plan (BCP) is the overarching approach to business recovery; the BCP generally contains individual plans for restoring departments back to business quickly after any type of interruption that disrupts normal healthcare operations.

A downtime or contingency plan focuses on sustaining a business function during short interruptions that are not classified as a disaster. Downtime may be planned or unplanned and both scenarios must include alternative ways of conducting business during this time. When creating a contingency plan, management must consider the following:

» Identify personnel responsible for each portion of the contingency plan, and include a list of duties for the staff when systems are down. For example, consider redistribution of workload so that all staff perform document preparation or other paper-based activities until systems are restored.

» Determine which applications and computer systems the HIM department relies upon in order to function.

» Identify the criticality of those applications and computer systems.

» Create temporary work-around procedures that will be implemented during system interruptions.

» Decide when and how to activate escalation procedures in order to provide continuous patient care and maintain the workflow of information for business operations.

» Decide how data captured on paper can be entered into the DMS once systems have been restored.

» Determine a plan for varying lengths of downtime and how staffing will be impacted. Consider differences in operations when down time lasts for less than four hours, four to eight hours, or more than a full shift.

» Determine a plan to validate system data for accuracy after the DMS is restored.

For more information on developmental steps of a facility's disaster plan relative to the collection and protection of health information, including a sample contingency plan, see the updated "Disaster Planning for Health Information" practice brief.

Document Management Operations and Best Practices

Discharge Processing

Timely capture of information, whether post-discharge or after a patient encounter, is critical. Discharge processing is a fundamental process that ensures timely pick-up and receipt of health information for scanning. Although this process is not new to HIM, this process starts the turnaround time clock and drives the entire document imaging process from beginning to end or, in the DMS environment, from patient discharge to availability in the EHR.

The remediation process includes tracking, accounting, and following up on all discharges (inpatient, outpatient, emergency department, and physician office, if applicable) to ensure all information has been received. While HL7 and ADT feeds are used for various reasons within a DMS, discharge processing uses HL7 to facilitate remediation.

Organizational teamwork should be strongly encouraged within this process. For documentation to be readily available for scanning as soon as possible after the discharge, an internal policy that outlines expectations is suggested. Consider the case of a patient returning to the emergency department (ED) 24 hours following her initial visit and a subsequent visit to a nursing floor. If the information from the initial visit has not been completed by the clinician(s) in the ED and sent for scanning, the patient's health information is not available to the healthcare team, which can create a patient safety risk. Thus, a scramble ensues to find the record and have it scanned immediately.

The following should be considered when making process decisions:

» During what shift(s) will the records be picked up?

- A schedule that lists every day of the week with the pickup location and time should be in place.
- Consideration must be given to heavy discharge times—if your highest discharge time window is 5 to 7 p.m., then a 9 p.m. pickup may be in order.
- Holiday schedules should be made well in advance with anticipation of volume uptake due to increase in discharges prior to the actual holiday.
- Seasonality should also be considered when scheduling records pickup, especially during flu and peak tourist season(s).

» How will records be transported?

- If records are created at multiple locations, will a courier be needed to transport records?
- What security protocols are in place to secure the protected health information (PHI)?

» Is the scanning flow documented?

- Does your staff know how a chart moves through the scanning process from beginning to end?
- Does the process consider all retrieval needs such as coding, chart completion, ROI, audits, and readmissions as in the example above?
- Do you have a procedure in place for scanner downtime?
- Do you have a procedure for when the paper record is requested and needs either to be copied or taken out of the department for patient care?

Turnaround Time

Turnaround time (TAT) starts at patient discharge and ends when the images are released into the DMS or EHR.

The first step in calculating the desired TAT is to define the parameters of TAT, such as

» What is the desired TAT to have records available post discharge?

» Will each patient type or service type have its own TAT goal? For example, will ED charts be held to a 12-hour TAT while inpatient discharges are held to a 24-hour TAT?

» Will high dollar charts be processed first if TATs are not being met?

» Will emergency department document types take priority over loose sheet document types?

» Will certain discharges be best processed during a particular shift?

Whether document management is performed in-house or outsourced, TAT terms can be mutually agreed upon before implementation begins. These metrics will assist in prioritizing the chart procedure and can dictate the workflow of each day starting with the chart collection schedule.

As a general rule, as part of the implementation process, it is necessary to work with stakeholders such as clinicians, department heads, and HIM staff to determine their requirements and expectations surrounding documentation availability. For example, ED records may need a faster TAT compared to inpatient discharge records. The targeted TAT goal is 24 hours; however, this goal is usually met only following a six-month adjustment period post-implementation. Meeting TATs on

a consistent basis requires a "Plan-Do-Check-Act" cycle for continuous quality improvement. It also requires management to closely monitor and improve upon all areas of the scanning process (prepping, scanning, indexing, quality assurance, and identifying documents that can be computer output to laser disc [COLD] fed to your DMS).

For more information on TATs, see the case study "The Electronic Health Record's Impact on Staffing and Turnaround Times: Centralizing the HIM Department in a Multi-Facility Environment."

Scanning Preparation

Chart preparation is the most time consuming and critical task in the document imaging process. If the process is performed correctly and efficiently from the beginning, it could reduce the time spent manually indexing.

The document preparation process is the equivalent of chart assembly and loose material sorting in the paper chart environment. The document preparation process involves grouping, identifying, and preparing health record documents prior to scanning so they can be captured efficiently.

Newer intelligent document recognition technologies can ease the labor burden and quality issues associated with traditional prepping. This technology can be used to classify document types and patient demographic information.

Careful consideration must be given to handling "blank sides." The organization must create a plan and involve the technology vendor and information technology in the decision making process:

» Will the DMS capture all pages (front and back)?

» Consideration must be given to if the DMS technology has the ability to delete blank pages or if staff will be trained on identifying pages to be deleted?

» Who will have the rights to delete?

» In which phase of the process will this be performed? Will blank pages be flagged at time of prepping such as page 4 of 4, caught during the QC process or will both teams be responsible for monitoring and handling blank sides?

» Fee structures with third party vendors must be clearly defined. It is critical that capture and charge of blank pages be clearly defined and understood in the contract phase.

For additional information on productivity, see the Productivity Monitoring section of this toolkit. In addition, for information on preparation, capture, and scanning best practices, see Appendix A, "Best Practices: Preparing and Scanning Documentation."

Document Capture

Understanding and managing the capture process is critical. While document capture may be performed using a variety of technologies, including scanners, electronic forms, electronic transactions, cameras, voice, and video. For the purpose of this toolkit, we will focus on scanning and electronic integrations.

Efficient document scanning can be achieved by utilizing a **centralized** approach, a **decentralized** approach or a **blended or hybrid approach**. Healthcare organizations must decide which capture model will work best in their environment by evaluating the size and type of organization, staffing, technology, and other resources that are available to make the project a success.

Centralized scanning requires that all documents within an organization be sent to a central location for document capture through high-volume scanning technology. Depending upon the size of the organization, documents may be delivered internally to the designated scanning location or they may be delivered via courier.

Decentralized scanning requires small scanners being placed at patient registration areas, nursing floors, physician office, outpatient clinic locations, emergency departments, and other on- or off-site locations. As paper documents are completed, they can be scanned and indexed immediately or placed in a queue for indexing later. Decentralized scanning allows more of the documents to be captured prior to a patient's discharge rather than the scanning being done within HIM after discharge. Registration information such as insurance cards and advance directives can be available immediately for benefit verification and patient care. Many organizations are using a blended or hybrid approach to documentation, using centralized and decentralized scanning throughout their facilities. For example, although a hospital may have a centralized scanning location in the HIM department to scan post-discharge, decentralized (point of care or point of service) scanning may be used to capture documentation such as a driver's license and insurance card at registration that may be needed as the patient moves through their visit.

Scanner size, speed, and functionality must be thoroughly investigated before acquisition and implementation to understand how the equipment will handle volume and certain document types. It is critical to purchase a scanner that is capable of handling expected volume particular to the organization's needs and scanner speed and functionality are directly related to productivity. It is also important to know the functionality of the equipment to evaluate document types for special handling. For example, can the scanner accept scanning of strips (such as telemetry) up to a certain length? Will the paper need to be cut in the preparation stage?

When evaluating document capture methods, focusing on capturing electronic transactions automatically will increase the volume of capture at the beginning of the project since it involves less labor. Electronic transactions include faxes, those documents received via COLD or electronic record management (ERM) systems.

It is important to consider data and image storage requirements as planning is underway for transition to a DMS. This is important even if the organization intends to use an EHR to store the majority of health information because electronic storage needs for images can be quite large and will grow over time.

For more information on data storage for scanned images, refer to Appendix B, "Document Storage Options and File Size Calculations."

To enhance the document capture process, consideration should be given to the following tools:

» **Patient labels:** Many organizations have policies that require placement of a patient label on every page to identify the patient. Data elements include the patient's name, medical record number, and other identifiers such as an encounter number, visit number, etc. This practice follows best practice and patient safety initiatives.

» **Bar coded separator sheets:** Many times form redesign takes months to complete. However, scanning operations may need to begin before this process is completed. Many systems allow the use of bar-coded separator sheets for each section of the record as a precursor to complete forms redesign. Inserted into a chart during the prepping stage, the separator sheet contains the bar code for the next group of documents (such as nurses' notes, orders, and such). This method requires more preparation time than bar coded forms, but it can act as an interim solution with higher accuracy and speed than could be accomplished by manually indexing each form.

» **Forms redesign:** One of the goals of forms redesign is to identify and describe the form characteristics required to ensure successful form identification when using a DMS. Complying with bar code design specifications will ensure the highest level of accuracy when using bar code recognition software. It also helps to identify form characteristics required to ensure better accuracy using forms recognition features of an optical character recognition (OCR) or intelligent character recognition (ICR) engine.

- Key points to consider include the following:
  - Each type of form needs its own bar code so that it can be automatically recognized when scanned.
  - Form names should be unique to the form and recognizable to the people who will be using the forms even occasionally.
  - Any requirements for the type of form name, length of name, bar code font, size of font, and such should carefully meet the requirements of the DMS and the EHR (if applicable).

» **Bar code types:** The best approach to scanning health records is to use 100 percent bar-coded forms. The longer an organization waits to incorporate 100 percent bar-coded forms, the less productive the scanning process will be. Although this is normally very difficult to achieve at the beginning of a scanning project due to the volume of forms that need bar codes and the presence of outside documents that are not consistent in appearance, the process of bar coding forms should begin as soon as possible.

» **Code 3 of 9:** Most DMSs support the Code 3 of 9 (also referred to as Code 39) bar code standard (see example in figure 1.1 below). This is an alphanumeric, self-checking, variable-length code that employs five black bars and four white bars to define a character. Furthermore, three of these bars are wide, and six of these bars are narrow. The wide bars or spaces are at least two, but preferably three, times the width of the narrow bars or spaces. When implementing DMS using bar codes, it is important to understand the bar code specifications, the bar code content, and the issues related to bar code placement on the form.

Figure 1.1—Sample 3 of 9 bar code

» **2D:** In addition to the 3 of 9 bar code standard, additional types of bar codes are growing in use in the United States (see example figure 1.2). There has been rapid expansion of the use of two dimensional (2D) bar codes in advertising and other commercial settings, and we have begun to see applications for use in the healthcare environment.

Examples of 2D bar codes include QR codes, which can be read by a cell phone with the correct application downloaded, or through the use of Aztec bar codes. The 2D bar code format has a few benefits over the 3 of 9 format, including the ability to store a larger amount of data, direct a user to a website, and enabling sorting or finding a particular form or page. They also lend themselves to the ability of being used in a more demanding environment such as in a clinical setting where they can be used on the wrist or ankle bands for newborns. In this setting, the format is better suited to a small size and curvature of the band when placed on an infant. It will be important to consider the next generation of bar-

coding fonts as well as recognition capabilities when selecting a document management vendor to ensure that needs will be met as the technology evolves.

Figure 1.2.—Sample 2D bar code

See Appendix C, "Bar Code Information and Guidelines," for additional guidance.

Productivity Monitoring

The ability to monitor performance is vitally important when managing the document imaging process whether the work is being performed on- or off-site, by the organization's employees or by a third party such as a document imaging vendor. Setting productivity expectations is critical to managing document imaging, and the following guidance should be taken into consideration when creating productivity monitoring standards.

Productivity monitoring starts with being able to adequately measure processes. Charts vary greatly in size and image count, so assigning a number of charts to a staff member who prepares them is not an accurate measurement. Many organizations use inches or weight to measure for performance and whether manual entry or computer entry into the document management system is used, a procedure should be in place outlining the process and recording of numbers.

With the understanding that every organization has different documentation practices, internal processes, approaches to technology, and strategic goals, the following (figure 1.3) recommendations are provided as a "general rule" to assist with creating departmental or organizational standards. The figure shows each production step from preparation to indexing with corresponding initial rates (typically during the first six months following implementation) and final rates (those rates at the highest end of the proposed goal). Rates below are shown as images per hour (IPH) per person. They have been shown to be typically observed for each process. To avoid backlog situations, the prepping and indexing rates should be closely coordinated. Prepping will typically be faster than indexing in the beginning, which is why the initial rates listed below show prep at a higher rate when compared to indexing. Managers should adjust staffing in these areas to meet anticipated volumes and scanning throughput. Also, these rates take into account that these tasks are the sole focus of the staff member during this monitoring time when the volume is maximized.

Production Step	Initial Rates: (images per hour)	Final Rates: (images per hour)
Preparation	400 IPH	600 IPH
Scan	1000 IPH	2500 IPH
Quality Assurance	800 IPH	2000 IPH
Index	300 IPH	800 IPH

Figure 1.3 — Sample production rates

It is also very important to recognize that scanner metrics vary depending upon the size and speed of the scanner. For example, larger scanners used for volume scanning operate much faster than a desktop scanner used to capture driver's licenses, advanced directives, and such. Standards should be tailored to the type and speed of the scanner being used. For example, a scanner that captures 2,500 images per hour would have a maximum capture rate for volume or batch scanning.

Indexing programs can also vary depending upon the steps involved in the process. The number of required fields and processes will affect productivity.

Quality control (**QC**) should be included in every step of the document imaging process, from receipt to release into the DMS or EHR. A comprehensive and well-executed QC program will help to create trust in record integrity for all users of the health record, and it is an important component to the overall success of the document imaging program. The goal of the quality program is to achieve the highest level of accuracy through index verification and scan quality.

The following should be considered when creating QC policy and procedures:

» Consider overall organizational strategic goals when framing DMS expectations and results.

» During prepping, QC measures may include whether or not primary documents are included:

- Are documents in order according to specific prepping guidelines set forth by the organization?
- Are missing information or documents present?
- Are flags or notes used properly to identify missing parts of the chart?

» Image quality, as well as content legibility, should be reviewed while identifying and validating data elements as defined by the general business rules set forth by the organization:

- All pages should be oriented to the correct reading position. Rotate any images that appear to be upside down or sideways.

- Patient information on all pages must be verified with accurate indexing to the patient, account, and document types levels. One task may include matching the identifying number (such as account number or medical record number) and patient name on the bar code to the remaining pages in the batch.
- Delete any blank pages without information as well as bleed through pages. For more on blank sides, see section titled "scanning preparation" contained within this document.
- A process should be in place to remediate the number of physical images scanned to the number of images captured in the software.

» While some organizations prefer to conduct QA reviews on 100 percent of scanned documents, others use a hybrid approach including random sampling or a certain percentage of documents to ensure accurate document capture. This approach should be determined by each organization based on what is right for its particular situation, taking risk, staffing, and budget into consideration.

» Note: Some DMS solutions contain the ability to monitor the entire scanning process (from prep to release) in real-time and are able to provide quality reporting post scanning such as number of imaged captures, number of blank pages, and such.

Quality Point System

Staff can be evaluated using a quality point system in conjunction with metrics and number of errors. Depending on the severity of an error, the employee would be assessed a certain amount of points within a review period. Errors such as mixed accounts or patients, missing images or pages, overlapping pages, or poor-quality images could be considered a critical or severe error while blank pages, unnecessary images, skewed images, or an incorrect document type could be considered a low-impact error. One formula that is used to measure quality is the percentage of actual errors as compared to the total records processed divided by the total cost of operations (including staff, hardware, software, furniture, space, maintenance, supplies, and such). This figure is then divided by the time it takes from receipt of the record to the time it is released into the EHR. The result is typically are double digit numbers where the higher value indicates better performance.[1] All quality programs should be reviewed by human resources and approved by senior management prior to implementation.

Reporting

Communication through reporting is a vital component to managing a DMS. It is important to work with the DMS vendor to understand the system's reporting capabilities and to be able to differentiate between the various types of reports (standard, ad hoc and custom) and to determine whether the organization will incur additional costs as a result of any custom reports. Prior to implementation, discussing reporting options and capabilities with the organization's DMS vendor will help ensure the necessary reports will be available at go-live.

When evaluating reporting, the following should be considered:

» It may be necessary to compare the new DMS system to a previous DMS system to understand which reports should be retained and which are no longer needed.

» How are reports generated? Can they be produced within the DMS application, or are they produced external to the application?

» If reports are generated external to the application, what platform is used to generate reports? Is extra software or hardware needed?

» What kind of reports can be produced? Is an internal report writer needed?

» How often will reports be generated, and can they be automatically scheduled?

» It is important to predefine "pages" versus "images" when evaluating the report data. While one person may think that a page consists of only one side, another may consider a page as two sides. Often, "images" is used where one image equals one side of the page.

Reporting is usually accomplished through the routine reporting of information in status reports to key individuals and groups. The following reports should be evaluated as the organization implements DMS routine reporting:

Quality Reports: To measure quality output within all functions according to the organization's needs

» Breakdown by problem categories (such as mixed accounts, mixed document, or poor image quality)

» Breakdown by error severity

» Breakdown by patient/service type

» Missing primary documents

» Overall quality with drill-down ability to the document imaging specialist (employee) for each step of the process

Productivity Reports: To measure productivity in all functions according to the organization's needs

» Turnaround time (TAT)

- High level (entire TAT for all functions including prep, scan,

index, and QC)

- Specific charts or specific document type (such as loose) to track increase or decrease in certain areas relating to EHR implementation
- Each stage of the scan process (prep, scan, index, and QC)
- All with drill-down ability to measure the individual document imaging specialist (employee)
- Criteria could include the following: User ID, total pages, total documents, pages per hour, documents per hour, average pages per batch and total hours spent performing the task. Reports can be generated for scanning as well as for indexing.

» Patient/service type

Operations: To assist in managing the day-to-day operations of document imaging

» Managing discharge list

» Courier tracking

» Quality feedback

» Chart tracking

» Change request

» Destruction notification

Research: Reports to assist in finding a specific chart in the scanning process

» By account number

» By medical record number

» By scan batch

» By box

Reporting from DMS document capture system: Reports that may be available specifically from the scanning application (usually separate from the DMS)

» Scanning productivity results

» Index productivity results

» TAT of each system

Staffing During Transition

For most organizations, the EHR transition will happen in phases. The impact on staffing and operations must be considered, and skill sets need to be assessed throughout the process to ensure the transition is successful.

Staffing concerns for document imaging can be different from other HIM roles. All job descriptions will need to be reviewed and revised to reflect new skill set(s). Like all HIM professionals, the ideal candidate should be able to maintain accuracy, focus on attention to detail, and uphold confidentiality, but an imaging specialist also needs to be able to adapt to a production-based environment, which requires an increased ability to remain astutely focused, work independently, and not be easily distracted. When recruiting for document imaging specialists, reference appendices D, E, F, and G to identify appropriate skill set and job description criteria in the following areas: Prepping, scanning, indexing, review, and quality control.

Skill sets should be time-tested during the interview process to evaluate how the candidate would perform in a high-production environment. The ability to remain focused amid high levels of activity and noise distractions is critical to the success of the process.

Cross training is recommended for ensuring continuity of operations in the event of a short-staffing circumstance as well as for discovering whether others possess special talent or interest in certain aspects of the operation. For information on one organization's experience with a DMS implementation in a multi-facility environment, please refer to the attached case interview, "The EHR's Impact on Staffing and Turnaround Times: Centralizing the HIM Department in a Multi-Facility Environment."

In addition, figure 1.3 is a scenario showing how to calculate the number of staff needed. The scenario assumes the department is capturing 3,500,000 images per year. The calculation is (images per year)/(images per hour) × 2080 to get the number of full-time equivalents (FTEs). It is very important to keep in mind that the initial rates and images per hour (IPH) will vary depending upon equipment and manufacturer. Before determining these rates, consultation with the organization's scanning vendor is highly recommended.

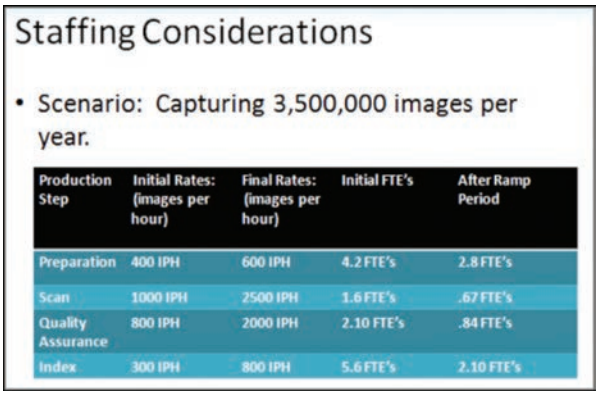

Figure 1.4 Excerpt from "Document Management and Imaging Best Practices to Manage Hybrid Records" Preconvention Workshop, 2011 AHIMA Convention Proceedings

System Design Options and Considerations

DMSs include tools to assist in the transition to the EHR and enhance integration. Document retrieval, viewing, distribution and workflow, including chart completion, are all important components to consider when attempting to leverage current technology to boost EHR adoption. In addition, integration is critical to achieving seamless EHR integration.

Document Retrieval, Viewing, and Distribution

Retrieving documents will depend on how a DMS is deployed. In some cases it could be through the organization's intranet, the Internet, an application on the desktop, or within the clinical system. Ideally, access is simple and does not require the user to jump back and forth between systems.

Methods of viewing and retrieving documents should be provided on-site in designated work areas or throughout the organization. Remote viewing should be provided to authorized users in particular to support viewing of documents from physicians' offices, remote completion of records, and remote coding or other job functions that may work virtually. Basic and advanced search methods should include filters and the appropriate security measures to track access and to limit access on a need-to-know basis.

Distribution of information must be managed by the organization and should include the following options:

» Online viewing only for authorized users

» Online viewing and printing (generally only provided to HIM staff to support release of information functions)

» Automatically fax for authorized users including scheduled distribution (for example, carbon copies of ED notes to the referring physician, scheduled at certain day(s) and/or time(s))

In addition, it should be noted that if a vendor hosts or retains the images or stores the record for the organization, it is a business associate, and the organization would need to execute a business associate agreement (BAA) that is compliant with the new HITECH rules.

Workflow

Workflow is a critical component of a DMS because it enables electronic routing and concurrent processing. Many tasks traditionally performed within the HIM department now can be performed remotely within the healthcare facility. Workflow rules identify how documents tied to the tasks can be assigned, routed, activated, and managed through these rules and directed to a staff member for disposition. For example, when the status of dictation changes from *dictate* to *transcribe* to *sign* to *signed,* a chart completion workflow rule will automatically update the status of the deficiency system without human intervention and simultaneously send a request for dictation or review and signature to the physician's inbox.

Coding is another critical HIM workflow in that it enables records to be distributed to coders' work queues. Coders are then able to perform their work using the EHR instead of the paper record. They should be able to route records to supervisors for coding questions, to physicians for coding query, or to auditors for prebill review. Coding from the imaged record or clinical system creates new opportunities to meet bill hold requirements, manage space, and recruit coders.

The HIM department's workflow changes significantly with the implementation of a DMS. In the implementation phase, HIM departments should articulate workflow assumptions, identify changes, and make decisions regarding which process(es) to implement.

Chart Completion

When converting from paper to electronic records, the chart analysis and chart completion processes change. With chart analysis, staff analyze records online instead of using the paper charts. One of the largest workflows in a document management system is most often chart completion, and within this workflow is the ability to electronically edit (annotate a scanned image), sign, add an addendum, and flag or tag deficient documents to electronically allocate a deficiency to the appropriate provider(s).

Electronic signature capability should exist for both scanned documents and text documents that are interfaced. Workflow rules can direct unsigned documents (scanned notes and dictated reports) to a physician's work queue either in the EHR or the DMS where they can be signed, edited, or an updated with an addendum. Updating documents and securing signatures electronically automates the record completion process with little human intervention.

Where in the workflow electronic signatures are captured and where finalized documents will reside is a fundamental decision that needs to be made when implementing the DMS and transitioning to the EHR. For example, if the majority of the facility's documentation resides in the EHR with a robust workflow, the organization may decide to capture and index documents in the DMS with an upload into the EHR, where that workflow is used to complete the record. However, on the other hand, if the majority of the documentation is interfaced and completed in the DMS, the organization may decide to use the DMS to capture, index, complete, and store the health record. For more information on the legal archive, see "Using Document Management as the Legal Archive."

As with all functions, policies, and procedures related to the DMS will provide consistent guidance to all employees within the organization. Policies and procedures should be reviewed to ensure consistency with laws and guidelines established by federal, state, regulatory, and accreditation (if applicable) agencies. Administrative leadership, HIM, information technology, information security, quality assurance, and clinical staff should be included in the process of developing enterprise DMS policies and procedures. The HIM department will need to develop policies and procedures specific to the document management system. The following are areas where specific policy and procedures unique to DMS will need special attention and guidance:

» **Corrections:** Policies and procedures should identify how and by whom correction can be made. Business rules may determine who can access and correct unsigned documents. Organizations should develop guidelines for changes made to signed and unsigned documents.

For example, if a document is changed or corrected, typically the copy with the error is removed from view within the DMS. However, a copy of the original document must be available particularly if it was viewable and relied on by clinicians. It is important that all staff are aware that these documents are available if needed. Workflow should be evaluated for ensuring corrected documents are redirected to the source of where the initial incorrect document was created or received.

• **Retraction, reassignment, resequencing:** These terms have different meanings and their corresponding action may differ. Therefore, it is best to define these terms.

- **Retraction** A retraction is the action of *correcting information that was incorrect, invalid or made in error,* and preventing its display or hiding the entry or documentation from further general views. However, the original information is available in the previous version. An annotation should be viewable to the clinical staff so that the retracted document can be consulted if needed.

- **Resequencing** involves moving a document from one location to another within the same episode of care, (e.g. a progress note that was linked to the wrong date). No annotation of this action is necessary.

- **Reassignment** (synonymous with misfiles) The process of moving one or more documents from one episode of care to another episode of care within the same patient record, (e.g. the history and physical posted to the incorrect episode). An annotation should be viewable to the clinical staff so that the reassigned document can be consulted if needed.[3]

Integration

Organizations have discovered that a DMS is a critical component when transitioning to the EHR. DMS allows providers of all sizes to move to an electronic record with minimal impact on clinical areas. As federal regulations such as The Health Information Technology for Economic and Clinical Health Act (HITECH) push for digitized information, document management and imaging can be a stepping stone or used in conjunction with the best-of-breed systems that create an EHR. For this reason, integration points are recommended in any Request for Information (RFI) or Request for Proposal (RFP) issued related to acquisition of DMS technology.

There are important technical considerations when evaluating integration points between the DMS and the EHR. Refer to the table in Appendix H, "Document Imaging and EHR Points of Integration," for high-level considerations that organizations can use to coordinate an implementation plan or an ongoing maintenance plan for DMS and EHR system configurations.

Implementation and Leadership

Regardless of the industry's progress on the path to the EHR, most healthcare organizations continue to utilize paper-based health information. Doing so results in a hybrid health record that is partially computer-generated and partially paper-based. The goal of a DMS is not only to manage paper, but also to manage all of the organization's documents (computer-generated and paper-based).

The following are best practices detailing the key steps in implementing a DMS.

Determining the Information Technology Strategy

AHIMA recommends that HIM computer systems complement the organization's EHR and clinical decision support systems that are acquired and installed in the healthcare organization. For this reason, asking questions about integration is critical to the strategy discussion.

Clinical Systems

Clinical health information systems are used by care providers to document the care provided to patients (such as computerized physician order entry [CPOE] systems and clinical documentation systems). HIM professionals typically focus on how to automate the familiar chart components, such as physician progress notes, nurses' notes, graphics, and ancillary notes.

In the past, clinical health information systems were created by clinicians for clinicians with little thought about their impact on HIM and other healthcare organization processes that work in the background to support caregivers, such as the creation

and maintenance of the legal record and revenue collection. Today's newer generation systems include these supporting process requirements. For example, many of these systems include the document imaging technology component of a DMS because supporting the process requirement of scanning paper-based documents remains useful until all physician, nursing, and ancillary documentation is captured in a digital format at every healthcare organization.

Scanning Implementation Options

Scanning is one type of technology that can be used in a DMS. It can be implemented as a stand-alone departmental solution or one that integrates with existing clinical applications. Often stand-alone solutions are installed in one or two departments such as HIM or billing, solving problems inherent in the access, movement, and storage of paper documents.

However, stand-alone scanning systems require implementers to consider how they will interact with clinical systems. These systems often stand on their own, with little connection with other systems except to receive data through interfaces. If an HIM department chooses this option, access to authorized users outside of HIM should be provided in a manner that does not require users to leave the clinical system to view information in the DMS.

Several clinical vendors now include scanning as a component of their clinical health information systems, thereby achieving greater integration with clinical applications than their stand-alone counterparts. It is becoming more common for clinical vendors to include the breadth of required HIM functionality, including scanning as a critical component.

The decision to purchase a scanning component as a stand-alone system or to purchase it as part of a clinical system should be based on where an organization is on the path to the EHR. It should also be based on the functionality provided by clinical vendors versus stand-alone scanning vendors.

If an organization decides to outsource its scanning to a document management vendor, technology choices and the integration with the EHR are very important to the overall success of the effort.

Planning Steps/Checklist: Once it is determined that the document management implementation is moving forward, the detailed planning steps must begin. To ensure a full return on investment, it is important to complete each step with adequate time for planning.

In addition, remember to include the appropriate stakeholders (users, influencers, key decision makers, and such) in the planning process. Also include key players on the EHR task force, and create a list of others who need to make a decision in the planning component.

There are 11 key steps in the planning process:

1. **Assembly:** Ensure the record is in optimal physical order for efficient processing for records to be scanned.
2. **Types of records:** Determine where each record type is stored and how reconciliation (check in and account for each chart, including outpatients') will occur on a daily basis
3. **Forms inventory/format:** Create inventory with a sample of each form considering redesign needs.
4. **Loose or late reports:** Determine policy on receipt of loose reports, adding in order or filing in back of chart, and codifying once entered into system.
5. **Physical layout of equipment:** Determine workflow in HIM department and consider the physical environment for scanning equipment and staff.
6. **Analysis, deficiency, and electronic signature process:** Ensure that the medical record is complete and that entries are timely according to established rules and regulations.
7. **Paper retention and destruction:** Determine disposal procedure for paper documents after scanning.
8. **Communications:** Ensure that all stakeholders receive critical information about the new system and its impact.
9. **Quality assurance:** After documents are scanned, establish indexing and quality control. Indexing is performed to assign document names and encounter numbers to each document. It is recommended that quality be performed on 100 percent of images to review the quality of scanned images. In addition to this initial quality control, ongoing quality monitoring should be performed on a random basis.
10. **Policy and procedures:** Develop new policies and procedures. Adapt existing policies to new processes related to changes in workflow, access, storage and retention, and such.
11. **Legal considerations:** The information stored is the entity's business record (in healthcare, the legal record). A plan to house this information on media other than paper must be scrutinized by legal counsel to ensure that the technology being considered can comply with federal and state laws, requirements for licensure, and credentialing, along with operational needs and that it is consistent with existing policies and procedures. There should also be a risk management component of the analysis to ensure that there will be no compromise to patient care and that documents required for lawsuits remain available. This latter consideration may impact an organization's decision on how to proceed with storage and retrieval of documents already scanned into the DMS.

The Implementation Phase

In the implementation phase, the real work begins. Establishing a project management team, solidifying work plans and creating a management reporting methodology for the implementation will be accomplished during this phase. Workflow will be redesigned and decisions will be made based on input from the HIM department and the vendor's project management team. During the process, many workflows and schematics will be designed and redesigned. Finally, the implementation phase will include testing, training, and the system going live.

Project Management: A strong project management team and plan will help ensure a smooth and successful transition to a DMS. This section provides resources and guidance that are typically involved in managing a DMS implementation. Please note that this list may vary by vendor or by organization. However, it is critical that the organization receive commitments from the vendor(s) that their implementation team members will support the go-live timeline.

Implementation Team Roles and Responsibilities

Vendor Roles and Responsibilities

» **Project manager:** Manages overall project and the vendor project team focusing on scope, time, cost, risk, and quality. Works closely with the enterprise project manager throughout the duration of the project.

» **Application consultant:** Provides expertise in configuring the software product to meet the needs of the enterprise, in addition to providing the enterprise with support to determine how the product will work best within the organization.

» **Programmers:** Provide expertise in coding the software product to meet the needs of the enterprise.

» **Integration analysts:** Provides expertise in developing interfaces and conversions to meet the needs of the project. In addition, provides expertise on the database level requirements.

» **System engineers:** Provides expertise on replacing and setting up the software.

Organization's Roles and Responsibilities

» The **project manager** manages overall project and the enterprise project team focusing on scope, time, cost, risk, and quality. The project manager works closely with the vendor project manager throughout the duration of the project.

» The **enterprise analyst** is responsible for data collection, coding and configuring tables, documenting end-user functions, and analyzing system reports.

» **Functional area managers** are representatives from the departments or areas that will be using the system. They provide area-specific knowledge and are responsible for providing input to work processes, test plans, staff training, and policies and procedures.

» The **steering committe**e is comprised of executive-level representatives from various enterprise departments who have a stake in the project. The project manager should be a member of this committee.

» The **interface analyst** performs data collection, coding or configuration, and testing for interfaces and also develops technical specifications and test plans for interfaces.

» The **network administrator** evaluates and facilitates the network level activities required by the project.

» The **server administrator** installs database-related software, monitors system operations, and performs system maintenance.

» The **system administrator** manages installation of hardware and software required by the project.

» The **desktop administrator** is responsible for workstation rollout required by the project.

» **Super users** provide application support to end users during and after activation.

» **Training resources** (training coordinator, trainers) manage the training process by determining training needs, developing training plans and classes, and performing end-user training.

Project Sponsors

Because the implementation of DMS and its components are far-reaching in terms of organizational impact, involved and committed sponsorship of the project is critical to successful implementation. The sponsors of the project are the visible champions and organizational spokespersons for the project. The importance of their role as key communicators to the senior leadership team and clinicians cannot be underestimated.

Project sponsorship should come from within the senior leadership of the HIM, information technology, finance, and clinical departments. Sponsors typically have a vested interest in the achievement of the goals set forth in the project charter. Because the goals of a DMS project typically range from the tactical (such as enabling the medical record to be concurrently accessed by multiple users) to financial (decrease the cost of offsite storage) to technological (decrease the page to page response time for the EHR), there usually are multiple sponsors.

Each sponsor brings unique perspectives to the oversight committee and can be instrumental in broadening the understanding of the DMS throughout the organization. As decisions need

to be made that may impact the workflow of different constituent departments, project sponsors should be called upon as negotiators who work on behalf of the project team to secure buy-in and cooperation with necessary changes.

In addition, if the organization has organizational behavior or change management processes, those individuals or groups should be engaged as well to facilitate the adoption of the process by the staff and clinicians.

Project Charter and Scope

The project charter is developed in collaboration with the vendor and the oversight committee. This document serves as a summary of the current environment, defined scope of the project, goals and objectives, change control procedures, team responsibilities, staffing requirements, project monitoring, and escalation procedures for issues or concerns that develop during the implementation phase. Although all components of the project charter are important, adhering to the agreed project scope is critical to keeping the implementation phase on time and on budget.

The project scope is a list of items that will be addressed during the implementation phase of the project. This list is utilized to define specific deliverables with clarification of expectations for each item. In a DMS project, this may include items such as which interfaces will be developed, the types of workflow tools that will be enabled, and the type of storage solutions that will be implemented. There is a shared motto, "if it is not documented on the project plan, it will not be done."

The project scope is mutually determined and agreed to by both the vendor and the organization. It also is an important point of reference for the duration of the project to reorient the various teams working on implementation to the agreed-upon deliverables for the project. Failure to maintain the project within scope ("scope creep") can often prolong the duration of the project and place it over budget. Out of scope requests that are brought forth by various constituents of the project are often added to a future considerations list. This list is often used post-implementation to determine needed enhancements to the end product.

Work Plan

The project work plan is used to guide the execution of the project. The work plan identifies tasks to be completed as a part of the project and assigns resources to those tasks. In addition, the work plan includes hours and durations estimated to complete tasks, as well as the sequencing of the tasks.

The major phases of the system development life cycle (SDLC) is the traditional way to plan and implement an information system in an organization. The major phases of the cycle are planning, analysis, design, implementation, and maintenance.

Conversion Options: Outsourcing

In preparing for implementation, the healthcare organization must consider its options for converting existing files and evaluating the staff resources available. Outsourcing may be a consideration for the conversion process as well as providing day-forward scanning on site.

Many organizations decide to contract with a document imaging vendor to assist with processing of any scanning backlog prior to the go-live date. While some organizations decide to use their own staff for day-forward scanning, others decide to totally outsource the entire scanning function including staff. The agreement with a scanning vendor should encompass technology and staffing for document imaging services 24 hours a day, every day. Some organizations decide to house the vendor's employees on site, while others decide to transport documents to a centralized vendor location.

Testing

Prior to going live, proactive steps should be taken to test the DMS thoroughly. Testing should be directed toward identifying and addressing any configuration problems, errors, bugs in the software, or user errors. Use a plan to ensure that the DMS is tested in the manner for which it is intended to be used by staff. Although the vendor may anticipate many scenarios, it is impossible to identify every possible scenario that the organization may encounter. The plan should include exactly what will be tested and who will be responsible. Testing is beneficial because it:

1. Mirrors the actual production system
2. Can be done repeatedly in order to operate without failure
3. Can be done comprehensively as per design
4. Can be done by super-users who will be familiar with IT issues
5. Allows users to play an important role in testing the system.

Note: The criteria for acceptance testing should be agreed to in the contract prior to its execution.

Training

Training users and the leadership team is a crucial step in the implementation of a DMS. A well-designed training program or plan will:

» Improve the chance of the DMS being properly implemented,

» Improve users' attitudes and behaviors toward the changes created by the DMS, and

» Make a key contribution toward a successful conversion to a DMS.

A training plan should identify:

» Who will be trained (users, end users, and leadership team)

» What is being covered

» How they are going to be trained (materials, handouts, lecture, slides, and such.)

» In what format they will be trained (classroom, distance education, etc.)

» When they are going to be trained (timeline, length of session)

» How often training will occur (initial, retrain, refresh, or annual)

» Costs of additional or follow-up training.

Training Plan Outline

	DESCRIPTION
Target Audience	• Identify who is going to be trained (leadership and end users). • Understanding the role of the user and their skill level helps prepare the trainer and can provide assistance when answering questions.
Course/Class Description	• The goals and objectives of the classes must be clear and well-defined. • The objectives assist the trainer in developing the program content.
Trainer/s	• Technical people should not be trainers. Use a professional trainer who knows how to educate and understands adult learning techniques, learning styles, and the psychological factors that impact users' perceptions and their ability to learn. • A train-the-trainer plan may be advantageous when preparing to provide training on various shifts. The plan provides the assistance of additional trainers, which is effective when providing many training classes to a large number of staff.
Training Setting	• The training environment must contribute to the learning process by making sure that the users are physically, socially, and psychologically comfortable. • A computer training room is a plus. • Some training may be done by a distance education option to allow training at the employee's convenience whether they are on-site or remote staff.
Schedule/Class Duration	• Numerous applications will increase the amount of time required for training. This means that users need to spend more time in class and away from their work responsibilities. • Training sessions should be as close to the go-live date as possible. Shorter, more frequent classes may improve the amount of information users can absorb at one time and improve the ability to schedule staffing coverage. • If training is to be provided during work hours, a strategy will need to be developed for backfilling staff and clinicians while they attend the training. Considerations also include whether these positions need to be covered by other staff, if clinicians need to alter their schedules, and if training is provided in the evenings or on weekends to avoid or minimize schedule disruptions. • Ongoing training and support after go-live. Users will have additional questions and need support after they have had hands-on experience with the system.

	DESCRIPTION
Training Aids	• Keep in mind adult learning principles and styles when creating educational materials. The trainer may find that using the computer along with a workbook with procedure steps is helpful. Handouts, reference aids, and storyboards from the vendor can be helpful.
Evaluate	• Determine whether to give the users a written exam or a practical evaluation. Evaluation of the training technique provides feedback regarding the users' reaction and the trainers' abilities. Post testing after training is an effective way to measure users' skills and knowledge. The evaluation also provides feedback regarding the ability of the users to transfer and apply skills and knowledge learned in training to actual work setting.
Follow-up	• Follow-up during the first go-live will immediately help the users with the transfer of knowledge learned in training to the real environment. This will also provide an opportunity to communicate any changes that have occurred during the period between the training and go-live.
Ongoing Training	• Training is ongoing. Training does not end once the DMS is in production. New employees, new releases, new policies and procedures will create the need to review and redefine training continuously. • Annual training should be conducted as a refresher and place where new ideas or processes can be shared.

Ensure that training and user manuals are readily available. One option is to have an electronic format of the manuals residing on the healthcare organization's intranet for easy access.

Note: The training budget and expectations should be agreed to in the contract prior to its execution.

The Post-Implementation Phase

The DMS is live and operational and the organization is one step closer to a complete EHR. In the post-implementation phase, workflows will be refined, revisions will be made to staffing and skill sets, and the process of reviewing documents will increase. Newly created file space will require management decisions while the project team determines how to provide ongoing training and maintenance of the system. Finally, to ensure the organization realizes the return on investment and benefits promised by the DMS, take time to measure your success. Vendor expectations in the post-implementation environment, including costs for additional services and support, must be clearly defined.

The EHR's Impact on Staffing and Turnaround Times: Centralizing the HIM Department in a Multi-Facility Environment

Case study based on interview with Suzanne Layne, RHIT, corporate director of health information management service at Main Line Health, February 2012

Suzanne Layne, RHIT, is the corporate director of health information management services for Main Line Health, a multi-entity health system in suburban Philadelphia. She has held several director positions in California and Pennsylvania during her 25-year HIM career. Layne is an integral participant in enterprise record management and revenue cycle management. She is a key member of the RAC committee, IT steering committee, and patient safety and quality committee. Layne has successfully installed multiple EMR systems and has consolidated five hospitals' HIM services into a centralized, off- site location. An RHIT with a bachelor of science degree in technical management, Layne is currently completing a Master's of Leadership Development degree at Penn State.

Introduction

Main Line Health in suburban Philadelphia is an integrated healthcare delivery system made up of five hospitals—four acute care hospitals and one inpatient rehabilitation facility. Two years ago, Main Line Health went live on an electronic (HIM) module, brought their legal health record online, and moved to a centralized, integrated model for managing their HIM functions.

System Design and Standardization Across Facilities

Main Line's goal with system design was to build once and deploy the model across all facilities. One of their strategies was to keep document indexing to a minimum. The acute facilities and the rehabilitation facility met to discuss how to standardize forms across facilities. Discussions included decisions like "a progress note is a progress note no matter which facility this is for." Main Line started out with 28 document types for scanning as part of this process. Two years later they have 30 scanned document types across all facilities.

Main Line also plans to implement the ability to capture the patient's signature directly onto an electronic form such as a consent form. One of the biggest challenges to implementing this feature is the variety of patient forms in the ambulatory settings. Many physicians have their own special sheet of discharge instructions for the patient to sign. Main Line's goal is to standardize these forms, have them electronically signed, and make them viewable via a patient portal.

Main Line's plan is to have more documents electronically fed into their document management system and thus decrease the scanned paper over time. Right now, about 40 percent of the patient's record is scanned. Their goal is to have no more than 10 percent of documents scanned as more systems are set up to feed their document management system electronically.

All documentation is now online including the forms inventory. The forms inventory used to be kept in big binders which got out of order and would often disappear. Now an online spreadsheet houses the information and includes cross references to ease searching. The actual forms are scanned and attached to the spreadsheet so staff can bring up the form. The forms spreadsheet is kept in a shared drive for all employees to access—no printing allowed! Everyone has grown to like the electronic solution.

Staffing Model

Main Line previously had one HIM manager at each facility for a total of five managers. As part of their centralization, these managers moved from their facilities to a central location and became specialized by function rather than by facility. The goal of centralization was to ensure that everyone had a job and was on board with the transition. Since the transition, one manager has resigned and the centralized HIM department now has one director and four managers.

The four managers are now organized by function (for example, transcription, record processing and storage, and release of information) rather than by facility. Managers still maintain a liaison role with the campus that they came from, but their focus is now a function-based role. The fifth manager position will be filled with a supervisor position focusing on release of information around ARRA, patient portal, and regulatory needs. Supervisors are also function-based rather than site-based. Managers' offices are at the centralized facility but they spend one to two days per week visiting their campuses. Supervisors are on site at each facility.

Part of the move to paperless records includes getting the staff to recognize that the HIM department of the future needs to be more technologically savvy. Main Line Health is striving to get everyone to function using as little paper as possible. Layne, the HIM director, has implemented paperless tools with her staff. For example, employees use an Excel spreadsheet to submit their time, coders clock time electronically, and vacation requests are electronic. Additionally, in their document imaging system, coding and HIM work queues are electronic—no stacks of paper charts waiting to be processed— charts are online. The staff is encouraged to use critical thinking in a virtual flow.

The staff was centralized in two phases. Anyone who did prepping and scanning was moved to the centralized facility in phase one. Managers, analysts, and release of information staff moved to the centralized facility in phase two. Coders and transcriptionists were moved home except for two coders who chose to work on-site. The coding supervisory team is located at the centralized location to facilitate meetings and ICD-10 planning.

There are two pay grades for employees who are responsible for getting the medical record online. Data processing technicians are responsible for document preparation, filing and scanning loose sheets, sending paper records to storage, and high volume scanning. Additionally, data quality control technicians are responsible for data integrity, quality control, and making sure that loose material is filed correctly in the chart. Staff in the HIM department at Main Line Health is structured to work in a job description below their current job but not above it. Quality control technicians must be able to prep and scan, but data processing technicians are not expected to do quality control.

Communication and Training

Communication was even more important than the project team thought it was going to be. Nursing was notified that the paper was going away. After go-live the HIM staff still got calls for charts and it took a long time for the clinical staff to realize that the legal medical record now resided in the document management system. While there were delayed learning curves in some areas, the HIM department reported through the chief medical officer at the time of the transition, so the team had great physician support. For physicians who had been practicing for a long time and who were resistant to giving up their paper charts, the HIM staff did one-on-one training.

The management team also found it was very important to communicate early and often with the HIM team to ease unrest and answer questions. Looking back, managers realized they should have had more formal communications early on. Later in the program they implemented a newsletter titled *On the Same Page*, which helped to keep the staff informed.

Main Line did not want to reduce or eliminate staff with their move to the online health record. Everyone got a job in the new structure and 94 percent of the staff got the job they wanted. Also, new positions were created as part of the centralization. An assistant system administrator position was created at each facility since the HIM managers were all located at the central offices. Additionally, two lead positions were created at the central location—one over document processing and one over quality control.

The staff was given homework assignments to help with their scanning education. Two weeks of homework was assigned before go-live. Staff was asked to scan inpatient and outpatient test batches. In addition to training the team, the homework did uncover some unexpected backend workflow issues. For example, a lot of forms were not bar coded in the behavioral health center and discharges were not being sent over in a timely manner. The goal was to scan all paper 24 to 48 hours post discharge.

Since the go-live of the new system, many of the staff have shown a renewed interest in returning to school and learning new technology. Staff benefits include tuition reimbursements and ability to participate in satellite classrooms. Main Line Health has established a relationship with higher education schools in their area, and they are able to provide their staff with continuing education opportunities right at their facility.

Storage and Destruction of Paper Records

Main Line Health's policy is to store the paper record for six months after the quality control process for the online record is complete. Main Line Health would like to reduce the length of time they retain paper to 90 days eventually. The director of safety and risk, in-house legal counsel, and the compliance officer do not feel that the HIM staff is ready for this yet. One challenge that the HIM department is still trying to overcome is improving scanning reliability. For some employees, a 100 percent quality check of scanned images is still needed while for other employees a sampling or spot check is sufficient. The goal is to be able to move to a sample quality check for all scanning specialists.

Once the paper has been scanned it is shipped to a short-term storage facility located at one of the Main Line properties. Every month a truck comes to this property and shreds any paper that is seven months old or older.

Main Line Health chose not to back-scan paper records prior to the implementation of their document imaging system. They have a separate off-site storage facility for the legal medical records that are still in paper form.

Benefits of Centralization and Online Records

The biggest benefits that Main Line Health realized with their move to an online record were reclaimed real estate and the cross training of teams.

Main Line Health's centralized HIM department is now housed in an off-site facility that is much less costly than the previous real estate each HIM department occupied at the individual Main Line Health facilities. That unoccupied real estate at the

healthcare facilities has quickly been spoken for. One facility has been able to build a large expansion to their outpatient cardiology services area due to the HIM department moving out. There is now more parking for patients at each facility since HIM staff have moved off-site.

Also, moving 10,000 square feet of HIM space out of the caregivers' area to real estate that does not need to be accredited by the Department of Health (since no care is given), has been a huge cost savings for the healthcare institution. In addition, the centralization of the team has led to a further cost savings due to a reduction in equipment needed. For example, only one supply cabinet is needed, and the team is able to share supplies such as toner, paper, and rubber bands where previously these had to be maintained for each facility.

With all HIM resources in one location, Main Line Health has been able to standardize jobs across facilities. The oldest records are scanned first, no matter from which facility. This allows staff to get all documents scanned within 24 to 36 hours of the record's arrival at the central facility. Records arrive first thing in the morning from each of the sites. Every day a courier delivers yesterday's inpatient discharges along with records of outpatient and emergency room visits. More than 95 percent of yesterday's records arrive in that one delivery, so the HIM department no longer gets a delivery later in the day. Each site's records are color coded so that staff can tell from which facility a record originated. HIM staff is organized into functional teams by color, and each team has a team captain. Team captains are rotated between teams and also given some supervisory responsibility and encouraged to promote collaborative spirit across teams. With this approach, Layne has found that her teams are now starting to self-correct issues and are realizing when to ask for assistance from a leader.

Improved Metrics

Another area where Main Line Health has enjoyed huge improvements is in HIM department metrics. Analysis time has decreased significantly across all facilities. Before centralization, one site had pretty good turnaround times—about three to five days. Another facility struggled with 10-day turnaround times and yet another averaged between 15 and 23 days. Now all records from all facilities are scanned into the system within 24 to 36 hours and have undergone analysis within 48 hours. Four staff members monitor and maintain the analysis and reanalysis queues for all five facilities. Physicians receive records to complete within two to three days of discharge. Dictations now flow in real time—they are available on the physician's online work-list as soon as they are dictated. Due to the real-time dictations, by the time records reach analysis, a large percent of chart deficiencies are already complete.

Prior to implementing their online medical record, Main Line Health's chart delinquency rates were in the high 20 to low 30 percent range. Delinquency rates are now in the two to four percent range. In addition to faster analysis turnaround times, deficiency letters are e-mailed to physicians so they receive them more quickly. Online medical records are available anywhere, anytime, so records can be completed remotely. Physicians can access their records from the floor if they have a few minutes between cases or even when they are on vacation.

Overall, Main Line Health has seen many benefits to implementing one electronic medical record across all facilities and centralizing HIM operations. They have reclaimed real estate to be used for patient care, cross-trained their staff and their management team, recognized economies of scale in one department for all five facilities, and have greatly improved their department metrics. But perhaps their biggest gain is the collaborative spirit and the insight into planning for the future of the ever-changing healthcare environment.

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Best Practices: Preparing and Scanning Documentation

Prepping

» Confirm patient name, medical record number, and account number on each page. This information should be documented on both sides of the page for best practice and patient safety.

» Place all "like" document types together in chronological or reverse chronological order (dependent upon organizational policy).

» Repair all torn or wrinkled pages.

» Remove all staples and clips from each page.

» If applicable, remove NCR copies and keep the originals.

» Original documents that are not legible should be stamped to indicate "poor quality."

» Third party barcodes should be blacked out or covered to prevent the application from reading the barcode incorrectly.

» Perforated forms should be torn apart for scanning or kept intact and oversized document settings should be used in the scanning process.

- By tearing apart perforated forms, the entire batch can be scanned under one document size setting.
- Some technology can sense the difference between legal size documents (8 ½ x 14) and letter size (8 ½ x 11) documents and adjust accordingly. This option should reduce the up-front documentation preparation time.
- Most scanners have a maximum setting available, and the scanner will detect the width and length that the input of the scanner can accommodate.
- Oversized documents must be scanned under the appropriate oversize setting. They can be scanned in the same batch; however, they should be placed at the beginning or end of a batch, and the paper size setting must be changed. Although scanning time is interrupted with this process, manual indexing can be avoided.
- Booklets and "foldouts" (such as nurses' flow sheets) should have a perforation at the "bound" or "foldout" edges for ease of separation into 8 ½ -by-11-inch pages during scanning preparation.
- Some foldout forms have a data column on the fold. These forms must be redesigned so that the perforation or "cut-out" is not on the data column. Note that a minimum inch (1") "neutral zone" on either side of the perforation or "cut-line" is recommended to ensure data is not lost.

» White paper is recommended for all documents that will be scanned because white will provide the best results for bar code identification, optical character recognition (OCR), viewing, and such.

» Shading of "bars" that contain text is not recommended because the text typically will not be readable after scanning.

» If colors are required for ease of manual identification, a color border around the edge with a white center is recommended.

» A minimum of 20 lb. weight bond paper is recommended for best scanning results.

» 24 lb. weight is recommended for double-sided forms to prevent bleed-through of ink and information during scanning.

» Do not use glue on the leading edge of a form. The edge that has been separated curls and will be misfed into the scanner. Also, the glue will build up quickly on the rollers and cause jamming.

» Note that portrait docs will typically be three-hole punched at the top so they can be put into a medical record chart holder (left-hand side of landscape docs will be three-hole punched).

» Holes across the top of a page could result in paper not being fed properly or paper jams if the holes have been ripped and are not taped.

» Note potential for three-hole punch on left side of some portrait docs (and the tops of some landscape docs) for standard three-ring-binder applications.

» When designing forms, it is important to not place information on the "back" side of the page in the same area as the bar code is on the opposite side. This could bleed-through during scanning and cause the bar code to be unreadable on the scanned image.

» Avoid small type; 8 point or larger is recommended.

» If applicable and available, encounter or batch cover sheets as well as visit cover sheets for each record (visit or account) should be utilized:

» Encounter or batch cover sheets will identify the batch, the patient and the encounter to where the scanned document will be indexed.

» Visit cover sheets will identify the existence of several visits or encounters in one batch.

Appendix A

Capture and Scanning Process

» Always verify scanner settings before scanning pages.

» Batches may be scanned vertically or horizontally. Remember to select the correct barcode orientations when scanning vertically or horizontally if not using enhanced barcode recognition. If you do not select it correctly, bar-coded documents may not be read, resulting in the batch requiring manual indexing.

» It is recommended that a batch not exceed one inch in thickness, or 100 pages, to allow for timely processing of the batch and to reduce the amount of rescan if an error occurs.

» Interactive scanning and document modification

- Is used mostly for rescanning or replacing documents. Usually a lower speed or flat-bed type scanner to especially handle odd-sized documents.
- Is recommended with the use of a smaller desktop scanner for loose sheet or point of service scanning because of the delay in the start of scanning on larger models.

» Loose material is commonly scanned under a batch header sheet and is manually indexed if account number bar-coding is not used on forms.

» Determining the most appropriate scanner settings can be a very time consuming process. It is important to create a batch that contains a variety of forms commonly found in a medical record at the institution. This batch can be used to test and modify the scanner settings to achieve the most legible images.

» It has been found that EKGs are more legible if scanned on a low speed scanner using grey scale or color settings. New high-speed scanners have provided sufficient quality for scanned EKG images.

» Simplex (single-sided) mode scanning should only be used if all the documents within the batch are set up as single-sided documents in the scanning software. All blank back page sides of the page will be ignored and deleted without requiring manual intervention. If simplex mode is used on a batch with two-sided documents, the outcome typically results in having to rescan the entire batch.

» Some scanning teams set the scanner timeout to zero so that it never times out, reducing the chance for unnecessary downtime. Scanner timeout settings can be different based on your scanner model.

» If you have a jam or a timeout on the scanner, scanner settings should be verified.

» Maintenance on the scanner depends on the amount of paper scanned in a day. To assist with high quality scans, daily tasks (or following each shift) should include vacuuming the scanner and cleaning the rollers and image guides.

» Fly paper, alcohol free pads, a soft clean cloth, and a vacuum are some of the cleaning supplies you can use. It is important to follow the maintenance and cleaning regimens that are recommended by the scanner manufacturer.

» Use antistatic mats under all scanners that stand on the floor directly to reduce the amount of friction generated.

» Calibrate scanners at least daily using proper calibration paper.

» Hole-punched documents periodically jam the scanner. This is caused by the placement of the hole on the page and how it passes over the scanner cameras. For that reason, some scanning teams scan landscape on the clean (not punched) edge.

» To assist the rollers in pulling one sheet at a time through the scanner, scan operators should fan the batch before placing it into the feeder.

» It is an option to end each job, let the scanner time out after each batch, or continue placing batches in the scanner until all are scanned. Each institution must determine which is more efficient for the staff and environment based on the scanner model.

» When scanning a batch that contains the same document type but different patients, it should be possible to print batch header sheets from the system that include the document type on the page. This allows the indexing team to select certain batches if there is a large backlog of a particular document type.

» When using multiple barcodes (account, MRN, or document type), batch header sheets should not be needed. Proper barcode configurations, document type, and MRN/Visit persistence modes are required for accurate auto-indexing.

» A mnemonic descriptor or inventory number may be used in systems that do not recognize bar codes.

Document Storage Options and File Size Calculations

The following are concepts related to document imaging:

» **Network connectivity:** Storage devices accessible from any point on a network

» **File system:** The actual logical file allocation and storage structure, how a database stores its information for retrieval. Typically optical disks required a specialized, proprietary file system to manage the optical platters and jukeboxes along with magnetic storage.

» **Hierarchical storage management:** The management of information through the use of multiple devices that handle the information at different points in its life cycle. An example might be to place the documents on magnetic, move them to optical, and later archive the optical to tape.

» **Backup and redundancy:** The mechanisms, both hardware and software, that keep copies of documents and system information to ensure data recovery upon catastrophic system failure or data loss

» **Direct attached storage:** Magnetic storage that attaches directly to a server, not necessarily through a network

» **Application service provider (ASP) based storage:** Managing documents and information via web access on servers and remotely located storage devices

Performance Implications

Choosing a document format requires a balance between performance, image quality, and storage limitations. If we use the page sizes described above, you can expect the following amount of data to flow through your network. We will assume that we have documents that are two pages in length.

File Sizes

The following is a sampling of scans performed using a desktop Fujitsu fi-4120C scanner. Photoshop Elements was used to accept the image from the scanner and encode it with the appropriate format. The application used to encode an image does not affect the actual size of the image as the calculation either follows a precise algorithm (such as BMP) or a proprietary compression algorithm (such as PNG). These sizes represent a single-sided medical form. For multi-paged documents, take the file size number (below) and multiply it by the total number of pages.

Color Mode	Paper Size	DPI	File Format	File Size (KB)
24-Bit Color	8.5x11	150	JPG/M Quality	345
24-Bit Color	8.5x11	150	JPG/H Quality	1,090
24-Bit Color	8.5x11	100	PNG	593
24-Bit Color	8.5x11	200	PNG	1,341
B&W	8.5x11	200	PNG	66
B&W	8.5x11	300	PNG	127
B&W	8.5x11	200	TIFF CCIITT G4	45
B&W	8.5x11	300	TIFF CCIITT G4	95

Software applications have limited opportunities to reduce the actual storage size of an image; however, they can improve or degrade the quality of the image. Many vendors use the VRS (Virtual Rescan) software published by Kofax Inc. to perform barcode reading and to auto-improve the document before the software receives it. The document is often significantly improved before being stored. If you compare the scanning results of Photoshop versus the files enhanced by Kofax VRS, it will be found that those documents have better quality.

Storage Requirement Calculations

How do you calculate the storage requirements for a particular format?

To answer this question, there is a series of calculations in order to estimate storage. A color bit map file format (BMP) size is calculated as follows:

Scan Width	8 inches
Scan Height	11 inches
DPI	150 (Dots Per inch)
Pixel Width	8 in X 150 DPI = 1,275 pixels
Pixel Height	11 in X 150 DPI = 1,650 pixels
Color Depth	24 Bit
Pixel Total	1,265 X 1,650 = 2,103,750

Appendix B

In addition, color depth must be considered. The color depth above (best quality) is **24 bit**. Since there are 8 bits in a byte, we have 3 bytes, or a color depth of a factor of 3. This means that it takes 3 bytes to store every pixel. To calculate the final size of this bit map, we multiple the pixel total, which is **2,103,750**, by **3.** The final size of this image would be **6,311,250** or roughly 6 megabytes (MB). This same file saved as a BMP color **16 bit** would be roughly 4MB because the bit depth would apply a factor of 2 (color depth) to the total pixel count

How do you scan and store a 150 DPI color JPEG and have a file size of 300KB or 300,000 bytes?

The answer is compression. The JPEG image format compresses the image pixels by combining like pixel colors and "remembering" where they go. The higher the compression ratio, the smaller the size but more data is removed. So, if you started out with **6,311,250** bytes and reduced it down to **300,000** then you effectively removed **6,011,250** bytes of data. When you are working with photographs, compression is often easy because there are so many like colors and repeatable patterns. Scanning a text-based document, then storing it in JPEG format sometimes proves to be problematic because of the data loss and precision required. If a person was reading a glucose level of **190** as **100**, that might be a significant problem for clinical care or medical research.

When saving to a JPEG file format, select the compression factor to apply. Most software applications display the choice as **Low**, **Medium** and **High** with degrees of precision in between each category.

Every image format uses a different compression mechanism. From an industry perspective, **TIFF** with **G4** compression or **PNG** is recommended for text-based documents. **JPG** is recommended for photographic images.

It is important to note in the following chart that the file sizes are per page. Multiply the individual page size by the number of pages in the document to determine total storage space required.

Color	Format DPI	DPI	Page Size (KB)	SAN size for 10MM Pages
B&W	PNG	200	50	0.5 TB
B&W	PNG	300	100	1 TB
Color24	PNG	150	650	6 TB
Color24	PNG	200	1,481	14 TB
Color24	JPG/6	150	275	2.5 TB
Color24	JPG/8	150	350	3.3 TB
Color24	JPG/12	150	830	8 TB
B&W	PNG	200	50	0.5 TB

Bar Code Information and Guidelines

Code 39 Supports the Following Characters:

» Twenty-six uppercase letters (A through Z)

» Ten digits (0 through 9)

» Seven special characters: minus sign (-), period (.), dollar sign ($), forward slash mark (/), plus sign (+), percent sign (%), and space ( )

» Start and stop characters, represented by an asterisk (*)

Code 39 Is in the Following Format:

» A leading "quiet" (blank) zone

» The start character (*)

» Data characters, with characters separated by an inter-character gap (blank space)

» The stop character (*)

» A trailing "quiet" (blank) zone

Two-dimensional (2D) Matrix Barcode:

» Encodes text or raw data in a pattern of black and white square modules

» Usual data size is from a few bytes up to 2 kilobytes.

» By adding error correction codes (according to the ECC200 standard) the symbols can be read even if they are partially damaged.

» Technical Data

- Normative standards: The normative standards for the Data Matrix barcode symbology are called ISO/IEC 16022:2000 and ISO/IEC 24720:2006 (ISO International Standard).
- DataMatrix data capacity: A single DataMatrix symbol can theoretically hold up to 3116 digits, 2335 alphanumeric characters, or 1556 bytes. Due to internal data compression algorithms the exact data capacity depends on the structure of the data to be encoded. The maximum Data Matrix capacity is also influenced by available printing space and the printer resolution.
- The default character set is Latin-1 or ANSI ASCII (equivalent to ECI 000003).
- Data Matrix supports the 'Structured Append' feature. Up to 16 DataMatrix symbols can be concatenated (linked). If a scanner or decoder supports this feature, it returns the concatenated data content in the correct order.
- Data Matrix printing quality: To optimize barcode quality a DataMatrix symbol should not be printed with dots smaller than 4 to 5 device pixels.

Bar Code Content

If standard forms are currently identified using a numeric or alphanumeric character string (such as MC1234), then configure the imaging bar code using that same numeric or alphanumeric string.

Bar codes can be used to identify the document or encounter number.

Placement of Bar Codes on Forms

When determining bar code placement on a form, it is important to consider the location of any addressographs or stick-on labels that may be applied to each document type. Also, the bar code may be preprinted on a form or printed on an adhesive-backed label that is manually applied to the form prior to scanning. There should be one bar code per form, and it should be placed in an area with the proper leading and trailing quiet zones as previously described. If the form's corners will be susceptible to wear, curling, fraying, or tearing, placement in these areas should be avoided.

» A unique bar code is recommended for the front page of every document that will be scanned and indexed. This means

- A unique bar code must be on the front side of a duplex document (required to ensure both sides [image] are properly indexed in the correct page order).
- A unique bar code must be on the front side of a multi-page document (required to ensure all sides are properly indexed). Length of document is determined by a setup value.
- A bar code is not required on the back (" blank") side of simplex documents, as these pages may be scanned in a batch that is being scanned in duplex mode, but they will not be indexed.
- All bar codes should be oriented to the same direction, either parallel to the direction that the paper travels or perpendicular. This will make scanning and reading of the bar codes more efficient and consistent.

The bar code must be surrounded on all sides (above, below, to the left, and to the right) by at least 0.25 inches of blank or clear space. This blank space comprises the leading and trailing "quiet" zones discussed in the preceding section of this document.

Print sample bar-coded forms to use for testing. If the location of the bar code is causing difficulty, reposition it. Each form should be scanned 30 to 50 times to test for a successful reading. Only when you are satisfied that a code and orientation is correct, and has been successfully tested multiple times, should you conduct a full form redesign and printing.

Appendix D

	Prepping
Skill Set Traits	» Quick hand-eye coordination » The ability to detect errors, locate certain information on any type of document, and quickly organize them by alphabetical or chronological order without error
Level	» Entry level » Prepares documents for scanning into the electronic document management system. Examines pages and verifies patient identification on each page.
Education	» High school graduate or equivalent with GED
Experience	» Experience in health information management department preferred » Good oral communication skills » Basic computer skills preferred
Required Skills	» Knowledge of health record format and content for all visit types » Ability to examine the record and verify patient identification » Ability to examine a form and determine its proper placement within the record » Ability to identify nonstandard forms and determine action required » Ability to navigate the patient registration system » Ability to push or lift up to 30 pounds » Detail oriented » Ability to evaluate and process a certain volume of documents per hour (set forth by organization)

	Prepping
Core Competencies	» Verify the chart remains in the appropriate order. » Check that documents contain appropriate patient identification (Account Number, MRN or Last Name, First Name). » Remove any interfaced or electronically generated documents (those that do not contain changes or hand-written notes added), per defined document rules determined during the implementation process. » Accurately assign index as outlined in the Document Matrix. » Remove any remaining staples, paper clips, and other binding materials from all pages. » Repair tears, holes and rough edges with transparent tape. » Put tape over sticky materials. » Unfold bent corners, and straighten curled edges. » For any documents on card stock or manila, such as Kardex or ambulance run sheets, make a photocopy before scanning. » Divider tabs or stickers that may "hang" over the edge of the document may be cut off, per defined document rules determined during the implementation process. » Duplicate copies will be identified as trash or "not to be scanned." Staff will follow established procedures for these documents, typically either placing in shred bin or at back of chart. » Mount and tape down any sheets less than 8.5 by 11 inches on an 8.5-by-11-inch sheet. » For sheets with rhythm strips or other mounted documents, tape down the top of the strip so it does not catch in the automatic document feeder (if you will be scanning in "Portrait" mode). » Perforate and number multipage forms into single pages so as not to destroy any information. » Documents that are of poor quality and may not scan well will be marked with a Poor Quality Original ("PQO") stamp. » Verify 100 percent of patient name, MRN, and account number at the start of every chart and on every page in the record, front and back. » Verify 100 percent of episode or encounter numbers at the start of every visit. » Provide 100 percent quality check for proper patient identification and document irregularities. » Arrange multipage documents in date order, either chronological or reverse chronological, per department guidelines. » Ensure all pages are in the same proper orientation. » If a document is identified as likely to result in poor image quality once scanned, photocopy the document, adjusting the copy contrast (lightness and darkness). This may help improve the quality of the scanned image. If improvement is not noted, follow departmental guidelines for processing poor-quality originals. » Once all documents are prepped for scanning, clip them together, and place them at the front of the folder. Set them aside until you are ready to deliver them to the scanning staff. Segregation of these documents in the folder allows all of the record to stay together (that is, in the patient's folder), and the scanning staff can select only the part of the record that is to be scanned.

Appendix E

	Scanning
Skill Set Traits	» Quick hand-eye coordination » Ability to read moving objects and if possible, have experience with scanning equipment
Level	» Entry level » Scans documents into the electronic document management system. Examines pages and verifies patient identification on each page. Appropriately batches documents. Maintains scanning equipment
Education	» High school graduate or equivalent with GED
Experience	» Experience in health information management department preferred » Good oral communication skills » Basic computer skills preferred
Required Skills	» Knowledge of health record format and content for all visit types » Ability to examine the record and verify patient identification » Ability to examine standard and nonstandard forms and determine their appropriateness for inclusion in the health record » Ability to perform troubleshooting, routine maintenance, and adjust settings on the scanning equipment » Ability to perform computer functions » Good hand-eye coordination » Good verbal communication skills » Ability to push or lift up to 30 pounds » Detail oriented » Ability to evaluate and process a certain volume of documents per hour (set forth by organization)

	Scanning
Core Competencies	» Perform daily maintenance of the scanner » Calibrate the scanner for proper image quality » "Fan" the stack of documents to be scanned in order to make sure the documents separate easily and that any previous hole punches or stapled pages do not stick together. Purpose: reduce the number of automatic document feeder misfeeds. » Once records are scanned, remove them from the scanner's out tray. Begin process of verifying the quality and accuracy of the scans. With the records face-up, view the hard copy and the scanned image to confirm all images can be read and all pages were captured. This can be done by flipping through the hard copies as you verify each image, page by page. Purpose: Reduce the number of rescans as a result of poor image quality or skipped pages. » As images are reviewed, change the rotation, switch sides, and the like, as needed. For example, documents that are typically viewed in "landscape" orientation should be rotated so they present to the end user in landscape mode. If a document was sent through the scanner so that the back page was scanned as the front page, switch sides to put the images in the appropriate order. Purpose: Improve the readability and use of the images by the end user. » If an image is identified as poor quality, adjust the scan sensitivity or use the copy machine to enhance the quality of the document to be scanned. Once the scan sensitivity is changed or the document is enhanced via the copy machine, re-place the image. Purpose: Reduce the number of records returned for rescan as a result of poor image quality. » Once initial quality review has been completed, transfer the folder to Assign Document ID. Clip or bundle the hard-copy pages together and forward them for document ID assignment. Purpose: The process of document ID assignment will provide a second review to identify issues with image quality or skipped pages. The hard-copy record must be available in order to accomplish this.

Appendix F

	Indexing
Skill Set Traits	» Able to identify objects and detect errors quickly » Good computer skills » Proficient with 10-key entry and typing
Level	» Intermediate level » Manually indexes documents to the correct level as established by facility policy. Minimizes duplicate records and overlap entries. Verifies data integrity. Coordinates information with master patient index, patient registration modules, and various other ancillary departments and modules
Education	» High school graduate or equivalent with GED » Associate degree: RHIT preferred
Experience	» Experience in health information management department preferred » Good oral communication skills » Basic computer skills preferred
Required Skills	» Knowledge of medical record format and content for all patient records » Competent knowledge and understanding of anatomy » Competent knowledge of medical terminology » Ability to review record and verify patient identification » Strong computer skills » Good verbal, written, and computer communication skills » Ability to perform job function and make decisions without direct supervision » Detail oriented » Ability to evaluate and process a certain volume (encounters, sections, or documents) per hour (set forth by organization) » Ability to interact with customers

	Indexing
Core Competencies	» Monitor the manual indexing queue of unassigned images. » Prioritize the batches in the queue and retrieve the batches for processing. » Confirm that all records ready for indexing have been received. » Review each electronic image within the batch. Compare with hard copy to confirm image quality, appropriate order and appropriate rotation. » Determine the correct patient name, medical record number, account number, document type, or section (if appropriate). » Index the image (encounter, section, or document) appropriately by required patient data elements according to facility specific guidelines. » Review and determine if image should be - Added as a new document to an existing record - Replacing a page within an existing record - Deleted » Bar code recognition of the client's documents » Optical mark recognition » Advanced forms recognition » Automated forms classification » Manual key entry of data » 100 percent Quality Review of indexing parameters and patient identification » Delete episodes when applicable. » Add episodes when appropriate. » Revise episodes when appropriate. » Relocate episode when appropriate. » Return for re-scan any images not appropriate for permanent storage.

Appendix G

	Review and Quality Control
Skill Set Traits	» Able to identify objects and detect errors quickly » Good computer skills » Proficient with 10-key entry and typing
Level	» Intermediate level » Reviews the electronic document management system and records contained within for appropriate image quality and indexing
Education	» Associate degree: RHIT preferred » High school graduate or equivalent with GED
Experience	» Minimum of three years HIM experience (mandatory) or associate degree: RHIT » Good oral and written communication skills » Basic computer skills
Required Skills	» Knowledge of medical record format and content for all patient records » Competent knowledge and understanding of anatomy » Competent knowledge of medical terminology » Ability to review record and verify patient identification » Strong computer skills » Good verbal, written, and computer communication skills » Ability to perform job function and make decisions without direct supervision » Detail oriented » Ability to evaluate and process a certain volume (encounters, sections, or documents) per hour (set forth by organization) » Ability to interact with customers

	Review and Quality Control
Core Competencies	» Determine the readiness of the batch for the quality control process » Locate the electronic document for verification against the paper batch » Review each image in the batch and verify the following: - Correct patient name and account level - Proper indexing level (encounter, section, or document) - Image quality (readable, orientation, multiple sides, double-feeds, etc.) » For each page scanned or indexed with errors - Rearrange out of order images within the electronic document; - Relocate electronic images that are incorrectly filed in another document; - Relocate electronic images or documents that are incorrectly filed in an encounter; - Replace electronic images that have unacceptable image quality or have been updated; and - Modify the indexing as appropriate.

Document Management System (DMS) and Electronic Health Record (EHR) Points of Integration

The table below displays some important technical considerations for integrating a document management system (DMS) with the electronic health record (EHR). It is organized by function and area of administration.

The integration points are grouped by functionality and by the organizational area responsible for building, implementing, or administrating them. Some integration points have been duplicated across administrative areas to indicate the need for inter-organizational coordination or to suggest the most appropriate administrator(s) to build and monitor a particular function. However, this will vary from organization to organization.

It should be noted that the integration points listed are not intended to be an exhaustive list, but rather a general set of high-level considerations that an organization could use to coordinate an implementation plan or an ongoing maintenance plan for most EHR/DMS system configurations.

continued on pages 39

Functions Areas of Administration	Interfaces/HL7 Messaging	Scanning	Document, Note and Transcription Type Development and Reconcilliation	HIM Chart Completion	Viewing Scanned Documents	Release of Information
IT/Network/ Desktop/ Hardware Administration	» Identify and map all inbound and outbound message types for ADT and MDM messages in interfaces middleware » Consider needs for order-level scanning messages (if used) » Consider merge, unmerge, and overlay messages for MPI reconciliation	» User Active Directory setup (if required by system) » Consider client/ workstation vs. Citrix deployment approaches » Scanner drivers set up/push » Imaging software and associated. files package set up and push » Consider PC performance requirements » Digital photo capture set up (if supported) » Consider support or help desk needs » Consider downtime/ DR measures for scanning and hardware maintenance	» Set up and verify translation (or similar) tables	» Provider or HIM user security or Active Directory set up (if required by system)	» Citrix server set up and replication » Workstation profile set up » User security/ active directory build (if required by DMS) » Consider image rendering latency times » Consider PC vs. thin client performance » Consider downtime or DR measures for viewing scans	» Print server configuration/setup » Consider how print files will be saved/retrieved on network drives » User security/ active directory build (if required by DMS)

continued on pages 40

DMS and EHR Points of Integration (cont.)

Functions Areas of Administration	Interfaces/HL7 Messaging	Scanning	Document, Note and Transcription Type Development and Reconcilliation	HIM Chart Completion	Viewing Scanned Documents	Release of Information
EHR Administration	» Identify/map all inbound, outbound message types for ADT and MDM messages for EHR integration and build » Consider appropriate patient encounter types and statuses used » Determine MPI reconciliation workflow	» Consider setup needed for scanning if initiated from EHR (custom buttons, executable paths, API configuration, .ini, .xml files, etc.)	» Build/set up of document, transcription and note types » Consider set up, mapping and placement of scanned document links in clinical views	» Build/set up of document, transcription and note types » Consider set up, mapping and placement of scanned document links in clinical views	» User security setup » Verify set up and mapping of scanned document links in clinical views	» Print server configuration/ setup » Determine scanned document type inclusion/ exclusion criteria » User security set up

continued on pages 41

DMS and EHR Points of Integration (cont.)

Functions Areas of Administration	Interfaces/HL7 Messaging	Scanning	Document, Note and Transcription Type Development and Reconcilliation	HIM Chart Completion	Viewing Scanned Documents	Release of Information
Document Management System Administration	» Identify and map all inbound and outbound message types for ADT and MDM messages for DMS build » Consider needs for order-level scanning messages (if used) » Consider merge/unmerge/overlay messages for MPI reconciliation	» Build provider and HIM user security that supports AD and EHR set up » Consider client/workstation vs. Citrix deployment approaches » Consider use and need for web-based approaches » Scanner drivers set up » Setup for digital photo capture setup (if supported) » Downtime, system upgrade, update, and ongoing maintenance	» Build document types and related security as required for DMS to integrate with EHR	» Provider and HIM user security that supports AD/EHR/DMS set up » Provider flat file build and ongoing maintenance » Document type and note type set up » DMS deficiencies set up that integrates with EHR set up » Sign or decline workflow to integrate with EHR	» User security set up that supports AD/EHR/DMS needs » Consider use/need for web-based approaches	» Scanned document type inclusion/exclusion criteria » User security set up